Method and device for producing a composite nonwoven for receiving and storing liquids

The invention relates to a method of producing a composite nonwoven for receiving and storing liquids or the like, comprising a carrier nonwoven which, to consolidate it, is e.g. hydraulically needled, and a pulp layer, such as a wood pulp layer, applied to the consolidated carrier nonwoven and brought into secure contact with same. A method of this type emerges from EP 0 540 041. There the carrier nonwoven is hydraulically needled, essentially not to consolidate it but in order to increase the permeability of the carrier nonwoven to liquid. To the carrier nonwoven needled in this way is then applied the super-absorbent pulp in a layer, and the two are brought into good bonding contact and then the composite nonwoven is dried.

It has become apparent that pure consolidation by compression only produces an insufficiently secure contact between the pulp and the carrier nonwoven. A satisfactory connection of the wood pulp fibres to the carrier nonwoven is known e.g. from US-A-3 560 326 or WO 92/08834, specifically through hydraulic needling of the wood pulp fibres with the consolidated carrier nonwoven. This type of connection results in a high loss of pulp fibres however. Tests have shown that up to 12% of the wood pulp fibres are washed out of the useful layer or bond and are thus lost for the efficiency of the product. Moreover, in this process very many pulp fibres get into the filtration, necessary in the case of water needling, of the circulating water. Due to the additional increased outlay for the purification of the recycled water, the

product also becomes more expensive. Water needling at only a low water pressure does not produce the necessary strength; or a stronger carrier nonwoven causes costs which are too high.

The object underlying the invention is to develop a method and a device necessary for accomplishing this method, by means of which a wood pulp loss of this kind can be avoided during the working cycle of the effective connection to the carrier nonwoven.

To solve the defined problem, provision is made according to the invention for a thin intermediate microfibre layer to be applied, e.g. using the meltblown process, to the consolidated carrier nonwoven, and the layer of pulp fibres only to be applied to this intermediate layer and everything interconnected. Expediently, this connection is also effected by means of hydrodynamic needling. The intermediate layer newly present in such a product acts furthermore advantageously as a barrier for the liquid to be received by the product. However, this barrier layer is not an airtight separating layer which would prevent the breathing activity of the product.

The production of a composite nonwoven solely from unconsolidated textile staple fibres or unconsolidated continuous polymer fibres together with a layer of meltblown microfibres and the hydrodynamic needling of these two layers to connect and consolidate the composite nonwoven is known from EP 0 418 493. There, however, this combination serves to produce a soft, dry nonwoven of a higher strength. Moreover, the nonwoven is intended to be so treated by means of water needling that it has a region of higher strength and one of

lower strength. In the idea of the invention, on the other hand, the microfibre layer is intended to produce a separating layer for the wood pulp layer to be applied to it, so that during the process of consolidation by means of water needling, the wood pulp fibres are not washed into the fibres of the carrier layer and thus lost for the product to be produced, with resultant costs.

A nonwoven formed from polyester and/or polypropylene fibres can be considered as the carrier nonwoven. This nonwoven must be first hydraulically needled, i.e. consolidated. Then, to the thus stable carrier nonwoven, a thin layer of a microscopically fine fibre, which is less than 1-5 µm thick, is sprayed onto the nonwoven in an even distribution. The cooling, ultra-fine fibres in a layer weighing between 1 and 4 g/m^2, preferably 2 g/m^2 combine to form a type of film yet do not present any such absolutely dense layer. On this barrier layer are then deposited the pulp fibres e.g. by means of the known air-lay method. This super-absorbent pulp layer is then connected by means of water needling to the carrier nonwoven which is covered by the intermediate microfibre layer, during which process the fine pulp fibres can be no longer or only slightly washed through the carrier unit and thus are retained for the useful effect of the product.

A device for accomplishing the method of the invention is represented in principle in the drawing by way of example.

First of all the carrier nonwoven has to be produced from the polyester fibres and/or the polypropylene fibres. To this end, e.g. a carding machine 1-4 or a

spunbonded fabric system, not shown, serves as the web-laying device. The carding machine comprises a hopper feeder 1 with a vibrating chute 2 disposed below same which transfers the fibres spread evenly over the width to the carding machine with the known carding and spiked rollers 3. The following continuous belt 4 transfers the laid carrier nonwoven to continuous belt 5 which runs first through a water needling device 6, only basically represented, for consolidation. Needling on drums is also conceivable here, as is described in DE-A-197 06 610. In a continuous working cycle, a thin layer of ultra-fine fibres is now applied in an even distribution to the carrier nonwoven by means of device 7 which operates according to the previously known meltblown process. These microfibres form a type of film, which consists however of individual fibres which are laid very closely to one another. On this barrier layer, the pulp fibres are now laid, using the air-lay process, by means of device 8 which is described in detail in EP 0 032 772. Thus the composite nonwoven is produced and only needs to be consolidated and dried. To this end it runs over path 9, shown in broken lines, to continuous belt 10 leading to the needling device 11 which can be constructed similar to device 6. In the perforated drum dryer, the drying can be carried out in a continuous process.

However, it is possible, before the last needling process 11, to lay a further layer of a nonwoven as a cover layer on the composite nonwoven after device 8, in order to bind the pulp fibres better into the end product and thus influence the linting. This purpose is then served by an additional carding machine 1', 3', by means of which an additional nonwoven is laid on the top of the product. Here again, a spunbonded fabric

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system is possible. Only then is the final water needling process 11 carried out with drying 12.